BEST AVAILABLE IMAGES

Defective images within this document are accurate representations of the original documents submitted by the applicant.

Defects in the images may include (but are not limited to):

- BLACK BORDERS
- TEXT CUT OFF AT TOP, BOTTOM OR SIDES
- FADED TEXT
- ILLEGIBLE TEXT
- SKEWED/SLANTED IMAGES
- COLORED PHOTOS
- BLACK OR VERY BLACK AND WHITE DARK PHOTOS
- GRAY SCALE DOCUMENTS

IMAGES ARE BEST AVAILABLE COPY.

As rescanning documents *will not* correct images, please do not report the images to the Image Problem Mailbox.

CLAIMS

1. Method for treatment of accumulators having at least one cell, preferably lead batteries, in which a varying direct current from a charging unit is applied in intermittent current supply periods, which are interrupted by current free pauses, the direct current being sufficient to generate gas in the accumulator, characterised in that said treatment constitutes a regeneration process, wherein said current supply periods have a length of between 0.01 and 0.5 seconds, a current level during said current supply periods amounting to between 80 and 1000 A, said pauses have a length of 1-20 seconds, and wherein process data, for at least one cell in the accumulator, is registered during the treatment process, which process data is used in order to control the treatment process.

2. Method according to claim 1, characterised in that a conductivity in an electrolyte in the cell, and/or a temperature in the electrolyte in the cell constitutes said process data.

3. Method according to claim 1 or 2, characterised in that sensors for said process data are introduced down into the electrolyte in each cell where process data is to be registered.

4. Method according to any of the preceding claims, characterised in that what is controlled during the treatment process is a length of said current supply periods, which may be between 0.01 and 0.5 seconds, preferably at least 0.1 seconds, even more preferred at least 0.15 seconds and 0.4 seconds at the most, preferably 0.25 seconds at the most, a length of said pauses, which may be between 1-20 seconds, preferably 1-10 seconds and even more preferred 1-5 seconds, typically about 3 seconds, the current supply periods preferably being considerably shorter than the pauses.

5. Method according to any of the preceding claims, characterised in that a current is applied during the current supply periods, which current is strong enough in order for each cell in the accumulator to reach a voltage of at least 2.5 V during the current supply periods.

6. Method according to any of the preceding claims, characterised in that said current level during said current supply periods amounts to at least 110 A,

preferably at least 200 A and even more preferred at least 250 A, but 1000 A at the most.

7. Method according to any of claims 1-5, characterised in that a current level during said current supply periods is 150 A at the most, preferably 110 A at the most.

8. Method according to any of the preceding claims, characterised in that the treatment process is performed in a number of cycles, preferably 5-30 and even more preferred 5-20 cycles, each cycle consisting of a regeneration part of 2-8 hours, preferably 2-6 hours and most preferred about 6 hours, and a charge part, preferably using standard charging, i.e. using a continuous current supply, during 0.5-2 hours, preferably about 1 hour.

9. Method according to any of the preceding claims, characterised in that said registering of process data and said controlling, is continuously performed during the entire or essentially the entire treatment process.

10. Method according to any of claims 1-8, characterised in that said registering of process data is performed during a predetermined time period of the entire treatment period, preferably during start up of the treatment.

11. Method according to any of the preceding claims, characterised in that said registering of process data and controlling based on this process data, is individually performed for all or essentially all cells in the accumulator.

12. Method according to any of the preceding claims, characterised in that the total current running to the accumulator during the current supply periods is registered, preferably by surveying of a mean value for said process data for a small number of current supply periods, optimal control, and thereby optimal treatment, thereafter being ensured when the mean value of the succeeding current supply periods, remains in the main constant.

13. Method according to any of the preceding claims, characterised in that general data, for each individual accumulator, is used for the controlling of the treatment process, which general data preferably is chosen from the group consisting of name of the customer, date, accumulator manufacturer, type number

for the accumulator, type values for the accumulator, year of manufacture, time of the first operational use of the accumulator, time between previously performed treatments, type of device in which the accumulator is used, and which general data preferably is registered automatically at start up of the treatment process.

14. Method according to claim 13, characterised in that older general data and process data too, for other accumulators and/or for previous treatments of the specific accumulator, are used for the controlling of the treatment process.

15. Method according to claim 14, characterised in that access to said older general data and older process data is ensured by connection to a network having a common database for these data for different devices for the treatment of accumulators.

16. Method according to claim 15, characterised in that said network also is arranged to be used for the surveillance of the treatment process and/or for the upgrading of software for the treatment process.

17. Device for treatment of accumulators having at least one cell, preferably lead batteries, which device comprises a transformer having a primary coil adapted to be connected to the electricity supply network, a secondary coil, a rectifier connected to the secondary coil, a positive and a negative cable clip, adapted to be connected to an accumulator which is to be treated, and an automatic actuator connected to the primary coil for intermittent connecting and disconnecting of the electricity supply network with short current supply periods interrupted by current free pauses, characterised in that said device constitutes a device for a regeneration process, the device being arranged to conduct said current supply periods with a length of between 0.01 and 0.5 seconds, a current level during said current supply periods being arranged to amount to between 80 and 1000 A, and to conduct said pauses with a length of 1-20 seconds, and in that the device also comprises means for registering/measuring of process data, at least in one cell of the accumulator, and means for controlling the treatment process based on this process data.

18. Device according to claim 17, characterised in that sensors for registering/measuring a conductivity in an electrolyte in the cell, constitutes said means

for registering/measuring process data, and/or sensors for registering/measuring a temperature in the electrolyte in the cell, said registering/measuring preferably being arranged to be performed by opening of the accumulator and applying said sensors.

19. Device according to any of claims 17-18, characterised in that said means for registering/measuring process data are arranged to individually register/measure process data in all or essentially all cells of the accumulator, the treatment process preferably being arranged to be individually controlled in these cells, based on the process data for each cell.

20. Device according to any of claims 17-19, characterised in that said means for controlling the treatment process comprises a control unit, preferably a microcomputer, and means for dynamically, during the treatment process, altering the length of said current supply periods to between 0.01 and 0.5 seconds, preferably at least 0.1 seconds, even more preferred at least 0.15 seconds and 0.4 seconds at the most, preferably 0.25 seconds at the most, a length of said pauses, which may be between 1-20 seconds, preferably 1-10 seconds and even more preferred 1-5 seconds, typically about 3 seconds, the current supply periods preferably being considerably shorter than the pauses, and optionally, the current level used.

21. Device according to any of claims 17-20, characterised in that the device is arranged to yield a current during said current supply periods, which current is strong enough in order for each cell in the accumulator to be brought to reach a voltage of at least 2.5 V during the current supply periods.

22. Device according to any of claims 17-21, characterised in that the current level during said current supply periods is at least 110 A, preferably at least 200 A and even more preferred at least 250 A, but 1000 A at the most.

23. Device according to any of claims 17-21, characterised in that the current level during said current supply periods is 150 A at the most, preferably 110 A at the most.

24. Device according to any of claims 17-23, characterised in means for the, preferably automatic, registering/feeding in of general data, for each indi-

vidual accumulator, which general data preferably is chosen from the group consisting of name of the customer, date, accumulator manufacturer, type number for the accumulator, type values for the accumulator, year of manufacture, time of the first operational use of the accumulator, time between previously performed treatments, type of device in which the accumulator is used.

25. Device according to claim 24, c h a r a c t e r i s e d i n that said device comprises means for connecting it to a database, preferably via a network, for use of older general data and process data for previous treatment processes, for other accumulators and/or for previous treatments of the specific accumulator, in the controlling of the treatment process.

26. Device according to claim 25, c h a r a c t e r i s e d i n that said network also is arranged to be used for the surveillance of the treatment process and/or for the upgrading of software for the treatment process.